

What is claimed is:

1. A non-aqueous electrolyte secondary battery comprising a positive electrode, a negative electrode and a non-aqueous electrolyte, wherein the positive electrode contains;

manganese-contained complex oxide containing lithium (Li), manganese (Mn), at least one kind of a first element selected from the group consisting of a metal element other than manganese and boron (B), and oxygen (O), while a mole ratio of the first element to manganese (Mn) (the first element/manganese) lies within the range of 0.01/1.99 to 0.5/1.5, both inclusive; and

nickel-contained complex oxide containing lithium (Li), nickel (Ni), at least one kind of a second element selected from the group consisting of a metal element other than nickel and boron (B), and oxygen (O), while a mole ratio of the second element to nickel (Ni) (the second element/nickel) lies within the range of 0.01/0.99 to 0.5/0.5, both inclusive.

2. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein a mixing ratio of the nickel-contained complex oxide to the manganese-contained complex oxide in the positive electrode, in terms of mass ratio (nickel-contained complex oxide/manganese-contained complex oxide), lies within the range of 90/10 to 10/90.

3. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein mean particle size of the manganese-contained complex oxide and

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the nickel-contained complex oxide is 30 μ m and below.

4. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein:

the manganese-contained complex oxide contains, as the first element, at least one element selected from the group consisting of iron (Fe), cobalt (Co), nickel (Ni), copper (Cu), zinc (Zn), aluminum (Al), tin (Sn), chromium (Cr), vanadium (V), titanium (Ti), magnesium (Mg), calcium (Ca) and strontium (Sr); and

the nickel-contained complex oxide contains, as the second element, at least one element selected from the group consisting of iron (Fe), cobalt (Co), manganese (Mn), copper (Cu), zinc (Zn), aluminum (Al), tin (Sn), boron (B), gallium (Ga), chromium (Cr), vanadium (V), titanium (Ti), magnesium (Mg), calcium (Ca) and strontium (Sr).

5. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein:

the manganese-contained complex oxide contains, as the first element, at least one element selected from the group consisting of cobalt (Co), zinc (Zn), aluminum (Al), tin (Sn), chromium (Cr) and magnesium (Mg); and

the nickel-contained complex oxide contains, as the second element, at least one element selected from the group consisting of iron (Fe), cobalt (Co), zinc (Zn), aluminum (Al), tin (Sn) and magnesium (Mg).

6. A non-aqueous electrolyte secondary battery as claimed in claim 1,

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the manganese-contained complex oxide is expressed by a chemical formula $\text{Li}_x\text{Mn}_{2-y}\text{Ma}_y\text{O}_4$ (where, $0.9 \leq x \leq 2$, and Ma represents the first element) and $y/2-y$ lies within the range of 0.01/1.99 to 0.5/1.5, both inclusive; and

the nickel-contained complex oxide is expressed by a chemical formula $\text{LiNi}_{1-z}\text{Mb}_z\text{O}_2$ (where, Mb represents the second element) and $z/1-z$ lies within the range of 0.01/0.99 to 0.5/0.5, both inclusive.

7. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein at least either the positive electrode or the negative electrode includes a positive electrode mixture layer or a negative electrode mixture layer provided on both sides or one side of a positive electrode collector layer or a negative electrode collector layer.

8. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein the negative electrode contains a material capable of occluding and releasing lithium.

9. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein the negative electrode contains at least one material selected from the group consisting of a metal and a semiconductor capable of forming an alloy and a compound with lithium, an alloy and a compound of the metal and the semiconductor, a carbon material, a metal oxide, and a polymer

10. A non-aqueous electrolyte secondary battery as claimed in claim 9, wherein the negative electrode contains at least one material selected from the group consisting of non-graphitizing carbon, artificial graphite, coke, graphite, glasslike carbon, polymer organic compound calcined materials, carbon fiber, activated carbon and carbon black.

11. A non-aqueous electrolyte secondary battery as claimed in claim 9, wherein the negative electrode contains at least one material selected from the group consisting of a Group 4B metal element, a semiconductor element, and an alloy and a compound of the metal element and the semiconductor element.

12. A non-aqueous electrolyte secondary battery as claimed in claim 9, wherein the negative electrode contains at least one material selected from the group consisting of silicon (Si), tin (Sn), and an alloy and a compound of silicon and tin.

13. A non-aqueous electrolyte secondary battery as claimed in claim 1,
wherein:

the positive electrode and the negative electrode includes a positive electrode mixture layer or a negative electrode mixture layer provided on both sides of either a positive electrode collector or a negative electrode

collector made of a band-shaped metal foil; wherein:

the positive electrode and the negative electrode are stacked with a microporous separator interposed therebetween and are rolled spirally.

14. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein the electrolyte contains lithium salt and solvent; wherein:

the solvent contains at least one material selected from the group consisting of propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate, 1,2-dimethoxyethane, 1,2-diethoxyethane, γ -butyrolactone, tetrahydrofuran, 2-methyl tetrahydrofuran, 1,3-dioxolane, 4-methyl-1,3-dioxolane, diethyl ether, sulfolane, methyl sulfolane, acetonitrile, propionitrile, anisole, ester acetate, ester butyrate and ester propionate.

15. A non-aqueous electrolyte secondary battery as claimed in claim 1, wherein the electrolyte contains at least one electrolyte selected from the group consisting of a gel electrolyte in which an electrolyte solution containing lithium salt is held in a polymer compound, a solid electrolyte in which lithium salt is dispersed onto a polymer compound having an ion conductivity, and an electrolyte made of solid inorganic conductor.

16. A material for a positive electrode containing:

manganese-contained complex oxide containing lithium (Li), manganese (Mn), at least one kind of a first element selected from the group

consisting of a metal element other than manganese and boron (B), and oxygen (O), while a mole ratio of the first element to manganese (Mn) (the first element/manganese) lies within the range of 0.01/1.99 to 0.5/1.5, both inclusive; and

nickel-contained complex oxide containing lithium (Li), nickel (Ni), at least one kind of a second element selected from the group consisting of a metal element other than nickel and boron (B), and oxygen (O), while a mole ratio of the second element to nickel (Ni) (the second element/nickel) lies within the range of 0.01/0.99 to 0.5/0.5, both inclusive.

17. A material for a positive electrode as claimed in claim 16, wherein:

the manganese-contained complex oxide is obtained by mixing in a desired ratio a lithium compound, a manganese compound and a compound containing the first element, which are selected from the group consisting of carbonate, hydroxide, oxide, nitrate and organic acid salt, and then calcining it by applying a heat treatment at a temperature of 600 °C to 1000 °C in an oxidizing atmosphere; and

the nickel-contained complex oxide is obtained by mixing in a desired ratio a lithium compound, a nickel compound and a compound containing the second element, which are selected from the group consisting of carbonate, hydroxide, oxide, nitrate and organic acid salt, and then calcining it by applying a heat treatment at a temperature of 600 °C to 1000 °C in an oxidizing atmosphere.

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